IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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| APPLICANT(s): | Vaisanen et al. | CONF. NO.: | 2361 |
| SERIAL NO.: | 09/856,746 | ART UNIT: | 2618 |
| FILING DATE: | 05/24/2001 | EXAMINER: | La, Lana N. |
| TITLE: | METHOD AND ARRANGEMENT FOR TRANSMITTING AND RECEIVING RF SIGNALS THROUGH VARIOUS RADIO INTERFACES OF COMMUNICATION SYSTEMS | | |
| ATTORNEY DOCKET NO.: | 1060-010346-US(PAR) | | |

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Commissioner of Patents
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Alexandria, VA 22313-1450

# APPELLANT'S BRIEF

This is an appeal from the Office Action (dated July 13, 2006) providing a rejection of the claims in the above-identified application, wherein claims have been rejected two or more times. Page 41 of the Action stated that the Action is made Final; however, the Summary on Page 1 of the Action stated that the Action is non-Final.

It is requested that the examiner indicate whether the present Office Action is intended to be a Final action or a non-Final action.

A Notice of Appeal was filed on September 25, 2006.

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The fee required for submission of this Brief is submitted herewith. An appendix of claims involved in this appeal is attached hereto.

## I. REAL PARTY IN INTEREST

The real party in interest in this Appeal is: NOKIA MOBILE CORPORATION, Espoo, Finland.

## II. RELATED APPEALS AND INTERFERENCES

There are no directly related appeals or interferences regarding this application.

## III. STATUS OF CLAIMS

Claims 1-3, 6-12, 16 and 18-29 are pending in this application. (Please note that there is error in the Office Action Summary given on the first page of the Office Action.)

Claims 4-5, 13-15, and 17 have been canceled.

Claims 1-3, 6-12, 16, and 18-29 have been rejected two or more times.

The claims on appeal are claims 1-3, 6-12, 16 and 18-29.

## IV. STATUS OF AMENDMENTS

A response to the previous Office Action, dated January 25, 2006, was filed without amendment of the claims (except for correction of one word in claim 1), the response providing an argument showing patentability of the claims.

Thereafter, the present Office Action, dated July 13, 2006, issued, repeated the grounds of rejections set forth in the previous Office Action, and provided a comment on the Applicant's argument. This Brief is the first response to the present Office Action.

## V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to a method and arrangement for transmitting and receiving RF (radio frequency) signals in a communications system (present specification, page 1 at lines 3-4), wherein the method and the arrangement are operable with communication systems employing different frequency bands, forms of modulation, multiplexing and/or coding schemes (page 1 at lines 11-13, page 5 at lines 24-26, page 7 at lines 8-14, page 9 at lines 26-31, and the tabulated data on page 10) by utilization of a programmable transceiver (page 3 at lines 32-34), the transceiver being a direct conversion based transceiver (page 4 at line 1) providing the advantages of small size and low power consumption (page 6 at lines 3-5).

With reference to the present specification and drawing figures, the present invention relates to a method for processing signals received from different radio interfaces of communication systems (claim 1), to a method for processing signals for transmission to different radio interfaces of communication systems (claim 2), to a direct conversion receiver operating at different radio interfaces of communication systems (claim 3), to a direct conversion transmitter operating at different radio interfaces of communication systems (claim 12), to direct conversion receiver circuitry operating in different radio communication systems (claim 21), to direct conversion transmitter circuitry for operating in different radio communication systems (claim 24), to a direct conversion receiver for operating in different radio communication systems (claim 26), to a direct conversion transmitter for operating in different radio communication systems (claim 27), and to a device for wireless communications operating in different radio communication systems (claims 28-29).

The advantages provided in both the method and apparatus aspects of the present invention, as set forth in the present claims, are obtained by virtue of features in the construction of the invention, as disclosed in the present specification on pages 6-9,

and in present Fig. 2. The teachings of the specification apply to the processing of a received signal as well as to a transmitted signal.

To show support of the claimed subject matter by the specification, consider first the handling of a received signal.

An incoming signal, received by an antenna is conducted to bandpass filters 2 that are controllable by a control signal FX1 in correspondence with a selected operating frequency band (page 6 at lines 16-22). Adjustment and tuning of the filters may be accomplished by programming (line 23). Thereafter, the received signal is conducted to a low-noise amplifier 4, wherein the amplifier gain is controllable in response to a signal GX1 (lines 23-27). This material from the specification and the drawing supports language found in the claims, such as in claim 1 by way of example, wherein the claim recites reception, filtering and amplification of a signal being received.

After the amplification, the received signal is conducted to a mixer 5 to be mixed with an RX mixing signal generated by a synthesizer 10 and divider 11 (lines 28-33). Output frequencies for the synthesized signal can be selected (page 7 at lines 8-14). Quadrature reference signals for mixing with the received signal are also provided by the synthesizer to obtain phase-quadrature baseband signals to be further filtered by low-pass filters 6 having adjustable cut-off frequencies controlled by control signal FX3 (lines 15-25). Again, with reference to claim 1 by way of example, this material supports the claimed recitation of mixing the received signal to obtain a complex baseband signal followed by low-pass filtering of the baseband signal.

Further, with reference to claim 1, the claim recites that the filtered baseband signal is amplified or attenuated, followed by conversion from analog to digital form, and processing to produce an information signal. This finds support in the specification (lines 27-33) wherein it is taught that the baseband signal is conducted to a gain

control block 7 operative with automatic gain control (AGC) followed by analog-to-digital conversion in a converter 8, and processing in a digital signal processor (DSP) 9.

It is noted that foregoing components, described in the specification, are adjustable and/or tunable so as to enable the claimed subject matter to handle incoming signals having the aforementioned different frequency bands, forms of modulation, multiplexing and/or coding schemes. Thereby, a function performed in the practice of the method of claim 1 or the apparatus of claim 3, by way of example, can be performed by a single component, such as the amplifier or mixer recited in claim 1, and the amplifier or mixing means recited in claim 3.

In similar fashion, it is shown that the specification provides for claimed subject matter dealing with the processing of a transmitted signal.

With respect to transmission, on page 8 of the specification (lines 3-8), it is taught that a quadrature baseband signal is generated in the DSP 9 on the basis of the information signal to be sent. The components of the digital signal are converted to analog form at converters 14 and low-pass filtered at filters 15. The cut-off frequency of the filters 15 can be controlled by a control signal FX4 so as to correspond to the characteristics of a selected radio interface.

This material from the specification and the drawing supports language found in the claims, such as in claim 2 by way of example, wherein the claim recites generation and conversion of a signal being processed for transmission.

The specification (lines 9-24) discloses further that a synthesizer 13 is employed to generate a mixing reference signal, in response to a control signal S2, having quadrature phase-shifted components for operation of a mixer 16 for complex mixing. As shown in Fig. 2, output quadrature signals of the filter 15 are applied to the mixer 16. Output signals of the mixer 16 are amplified in an amplifier 17 that has AGC with

gain controlled by a control signal GX3. Still further amplification is provided by a power amplifier 18 that has an operating frequency band selectable by a control signal BX.

This material supports further subject matter of claim 2, namely: the generation of a mixing signal, the generation of a transmission signal from the baseband quadrature signal, and the amplification of the transmission signal.

It is noted that various ones of the foregoing components, described in the specification, are adjustable and/or tunable so as to enable the claimed subject matter to handle outgoing signals having the aforementioned different frequency bands, forms of modulation, multiplexing and/or coding schemes. Thereby, a function performed in the practice of the method of claim 2 or the apparatus of claim 12, by way of example, can be performed by a single component, such as the amplifier or mixer recited in claim 2, and the amplifier or mixing means recited in claim 12.

Thus, it is seen that claimed subject matter is directed to the features of construction in the present invention, wherein one component can perform a function performed by plural components in the prior art, and wherein the capacity for adjustment and tuning of various components, as by programmability, enables the claimed subject matter to process incoming and outgoing signals having different frequency bands, forms of modulation, multiplexing and/or coding schemes.

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are treated in this appeal, namely, the grounds raised in the following issues:

1. Whether Claims 1, 3, 11, as well as claims 21-23, 26, and 28 (pages 10-20 of the Office Action) should be rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076) and Smith (US 5694414) for reasons set forth in Point 2 of the present Office Action. (It is noted that Point 2 of the Action made reference also to claim 4, but this is believed to be in error because claim 4 had been canceled in a prior response of the Applicant.)

2. Whether Claims 6-7 should be rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumably Smith US 5694414 is intended) and Heck (US 5483691) and Auvray (US 5953641) for reasons set forth in Point 3 of the present Office Action.

3. Whether Claim 8 should be rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumably Smith US 5694414 is intended) and Heck (US 5483691) and Duong (US 5511235) for reasons set forth in Point 4 of the present Office Action.

4. Whether Claim 9 should be rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumably Smith US 5694414 is intended) and Eklof (US 6308050) for reasons set forth in Point 5 of the present Office Action.

5. Whether Claim 10 should be rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumably Smith US 5694414 is intended) and Heck (US 5483691) for reasons set forth in Point 6 of the present Office Action.

6. Whether Claims 2, 12, 16, 18-19 (page 32 of the Office Action), 20, 24-25, 27, and 29 should be rejected under 35 U.S.C. 103 as being unpatentable over Auvray (US 5564076) in view of Razavi (RF Microelectronics), Auvray (US 5953641) and Smith (US 5694414), plus Gore (US 6484038) in the case of claims 27 and 29 (pages 35-40 of the Office Action), for reasons set forth in Point 7 of the present Office Action.

## VII. ARGUMENT

In the present Office Action, Claims 1, 3, 11, 21-23, 26 and 28 were rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076) and Smith (US 5694414); Claims 6-7 were rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumed to be Smith US 5694414) and Auvray (US 5953641); Claim 8 was rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumed to be Smith US 5694414) and Duong (US 5511235); Claim 9 was rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumed to be Smith US 5694414) and Eklof (US 6308050); Claim 10 was rejected under 35 U.S.C. 103 as being unpatentable over Isberg (US 6029052) in view of Auvray (US 5564076), Smith (US 5796772, presumed to be Smith US 5694414) and Heck (US 5483691); and Claims 2, 12, 16, 18-20, 24-25, 27 and 29 were rejected under 35 U.S.C. 103 as being unpatentable over Auvray (US 5564076) in view of Razavi (RF Microelectronics), Auvray (US 5953641) and Smith (US 5694414), plus Gore (US 6484038) in the rejections of claims 27 and 29 for reasons set forth in the present Office Action.

The following argument is presented to overcome the grounds of rejection raised by the examiner, and to show the presence of allowable subject matter in the claims.

It is noted that, of the various references applied in rejection of the claims, only two of the references, Auvray (US 5564076) and Smith (US 5694414), were applied against every one of the claims.

### FIRST ISSUE OF WHETHER CLAIMS 1, 3, 11, 21-23, 26, and 28 SHOULD BE REJECTED UNDER 35 U.S.C. 103 AS BEING UNPATENTABLE.

Claims 1, 3, 11, 21-23, 26, and 28 were rejected under 35 U.S.C. 103 as being unpatentable over Isberg in view of Auvray '076 and Smith.

It is believed that the teachings of Smith, in combination with teachings of other ones of the references, are misapplied in the rejections of various ones of the claims, as may be demonstrated with respect to the rejection of claim 1. The Examiner tries to use Smith to show anticipation for the following claimed feature:

"*a gain of said amplifier is set with a program-controlled gain control signal in relation to the radio interface from which signals are received*".

But Smith does not disclose that a gain of the common amplifier would be set with a program-controlled gain control signal in relation to the radio interface from which signals are received. Smith says that the preamplifier 203 is tuned to different frequencies, i.e. that its frequency response is changed. It is urged that this teaching is very different from the practice of the present invention in controlling the gain of the amplifier.

The same argument applies to the Examiner's rejection of the other independent claims 2, 3, 12, 21, 24, 26, 27, 28 and 29. In each case the Examiner cites Smith, in combination with the teachings of other ones of the references, to show anticipation for the program-controlled gain feature. However, it is the Applicant's position that Smith only considers tuning the amplifier to different frequencies, but does not teach a changing of the amplifier gain.

This point was made in the previous response of the Applicant. But the examiner held to his position (Office Action, page 40, Point 8) and stated that the programmed control

signal of Smith is in response to the received radio band at the radio interface, and not just to tune to different frequencies.

A closer analysis of the Smith patent reveals the following. The passage cited by the examiner (Smith, col. 3 at lines 55-57, and element 203 in Fig. 3) at the bottom of page 4 of the Office Action states clearly that the preamplifier may be switch selected or tuned to the appropriate band. This passage says nothing about amplifier gain.

Further discussion appears in col. 7 of Smith (US 5694414). The text at line 19 provides a listing of components of the circuit and refers to the preamplifier 205 rather than the preamplifier 203 appearing in Fig. 3. Lines 26-29 confirm the identity of the preamplifier 205 by mentioning its connection between the filter 117 and the converter 209, which conforms to the connections depicted in Fig... 3. Thus, there is error in the Smith drawing, and the correct identifying numeral for the preamplifier should be 205. This error is corrected in the later patent of Smith (US 5796772).

Further, in col. 3 at lines 50-57, Smith teaches that the preamplifier 205 amplifies either the narrowband signal or the spread spectrum signal, and is switch selectable to the desired band dependent on a signal received from the mode controller. It is important to note that there is no teaching in Smith about the gain of the preamplifier, for example, as to whether the gain is the same or different in the two channels, or whether the gain is adjustable or fixed. In contrast, present claim 1 recites that "a gain of said amplifier is set with a program-controlled gain control signal in relation to the radio interface from which signals are received".

Thus, it is clear that a programmable gain, which implies clearly that the gain of the amplifier is adjustable in response to a program, is set forth in claim 1, and that no such teaching of gain adjustment is taught by Smith. Therefore, Smith does not support the rejection advanced by the examiner. Similar wording appears in other ones of the

claims rejected on this point, so that the foregoing observation of the inapplicability of the Smith reference applies also to the other rejected claims.

Again, it is noted that the examiner responded (Office Action, page 40, Point 8) that the programmed control signal of Smith is in response to the received radio band at the radio interface, and not just to tune to different frequencies.

The examiner does not cite any specific passage of Smith to support this position. The Smith description does not contain the expression "in response to" otherwise than in the passage describing Fig. 13, where it teaches how the multiplexer 675 selects one of the two outputs from amplifiers 670 and 671 in response to a band select signal 676 (col. 17 at lines 53-61).

It is urged the programmed control signal of Smith is synonymous with the control signal $f_{in}$ that comes from the mode controller 103 to the preamplifier 203 in Fig. 3. Smith says that "the mode controller 103 is used to select reception of narrowband or spread-spectrum modulation" (col. 7, lines 37-39). In other words, the mode controller 103 contains knowledge about whether the receiver should operate to receive narrowband signals or wideband, spread-spectrum signals. Depending on this selection, the mode controller 103 composes control signals to the electrically controlled components 117, 203, 105, 104, 107, and 219, as shown in Fig. 3, in order to make these operate according to the appropriate bandwidth selection.

Apparently the only passage of Smith presenting any description of how the control signal affects the operation of the preamplifier is in column 7, lines 50-57, which teaches that:

"The preamplifier 205 amplifies the filtered narrow-band modulated signal when the mode controller 103 is set to the narrowband modulation setting, and amplifies the filtered spread-spectrum signal when the mode controller is set to the spread-spectrum

modulation setting **and is switch selectable to the appropriate band for each mode** where the dual mode[s] occupy noncontiguous or widely separated frequency bands." (emphasis added)

Thus, from the disclosure of Smith, there is a teaching only that the frequency response of a preamplifier should be switch selectable, so that the amplifier's frequency response does not cause distortions to the received signal when the received signal band varies, but the amplifier is correctly operable on the appropriate frequency band each time. This is simply not the same as the feature, set forth in the present claims, of "...a gain of said amplifier is set with a program-controlled gain control signal in relation to the radio interface from which signals are received.." This feature is set forth in present claim 1, and corresponding passages of other independent claims where program-controlled gain setting is disclosed.

A further argument, which was presented by the Applicant in the previous response relates to the Isberg patent on which the examiner relies, in combination with the teachings of other ones of the references, for the rejections of claims. The teaching of Isberg provides an inherent incompatibility problem with the present invention as claimed. The band-splitter 30 in Isberg's Fig. 5 does not include any kind of switching; it is only a filter bank that continuously outputs the component signals on each frequency band as long as they were included in the original signal received through the antenna. A band selection function, i.e. a decision concerning which of the component signals is to be accepted for further processing, is accomplished only by enabling one of the low noise amplifiers 34a, 34b and 34d (Fig. 5) with the BandSelect signal.

To emphasize the distinction between the Isberg teaching and the subject matter of the present claims, attention is directed to the following claimed feature:

"*amplifying of the carrier frequency signal is performed with one and same amplifier for signals received from at least two different radio interfaces*" (claim 1, emphasis added).

If the circuit shown in Isberg's Fig. 5 were to be modified by replacing the parallel low noise amplifiers 34a, 34b and 34d with a single, common amplifier (the above-cited claim passage recites "one and same amplifier"), the apparatus would not be able to implement any band selection function at all, but the component signals coming from all applicable radio interfaces would all be present still at the output of the imaginable common amplifier. The foregoing argument demonstrates that Isberg does not employ band switching in conjunction with a common amplifier, but requires a plurality of individually actuatable amplifiers.

The foregoing argument is believed to overcome the rejections of the claims 1, 3, 11, 22-23, 26, and 28 plus claim 21 considered in the first issue of the Office Action to show that the claims are allowable.

**SECOND ISSUE OF WHETHER CLAIMS 6-7 SHOULD BE REJECTED UNDER 35 U.S.C. 103 AS BEING UNPATENTABLE.**

Claims 6-7 were rejected under 35 U.S.C. 103 as being unpatentable over Isberg in view of Auvray '076, Smith, and Auvray '641. The examiner made reference to Smith (US 5796772) which discloses material presented also in Smith (US 5694414). Since claim 7 depends from claim 6 which depends from claim 3, and the rejection of claim 3 is based in part on Smith '414, it is presumed that Smith US 5694414 is intended also in the rejections of claims 6-7. The argument herein presumes that Smith '414 is the intended reference.

The examiner notes, in the rejections of claims 6 and 7, that Isberg, Auvray '076 and Smith are applied as in claim 3, and that Auvray '641 is relied upon to show further

details recited in the claims. Accordingly, the foregoing argument with respect to the inadequacy of the teachings of Isberg and Smith, in respect to the rejection of claim 3, applies also to the rejections of claims 6-7. Therefore, claims 6-7 are believed to be free of rejection and to be allowable.

**THIRD ISSUE OF WHETHER CLAIM 8 SHOULD BE REJECTED UNDER 35 U.S.C. 103 AS BEING UNPATENTABLE.**

Claim 8 was rejected under 35 U.S.C. 103 as being unpatentable over Isberg in view of Auvray '076), Smith, and Duong. The examiner made reference to Smith (US 5796772) which discloses material presented also in Smith (US 5694414). Since claim 8 depends from claim 3, and the rejection of claim 3 is based in part on Smith '414, it is presumed that Smith US 5694414 is intended also in the rejection of claim 8. The argument herein presumes that Smith '414 is the intended reference.

Claim 8 depends from claim 3. The examiner notes that Isberg, Auvray '076 and Smith disclose the receiver of claim 3, but do not disclose controlling the cut-off frequency of low-pass filtering. Duong is relied upon to show these further details recited in the claim. Accordingly, the foregoing argument with respect to the inadequacy of the teachings of Isberg and Smith, in respect to the rejection of claim 3, applies also to the rejection of claim 8. Therefore, claim 8 is believed to be free of rejection and to be allowable.

**FOURTH ISSUE OF WHETHER CLAIM 9 SHOULD BE REJECTED UNDER 35 U.S.C. 103 AS BEING UNPATENTABLE.**

Claim 9 was rejected under 35 U.S.C. 103 as being unpatentable over Isberg in view of Auvray '076, Smith, and Eklof. The examiner made reference to Smith (US 5796772) which discloses material presented also in Smith (US 5694414). Since claim 9 depends

from claim 3, and the rejection of claim 3 is based in part on Smith '414, it is presumed that Smith US 5694414 is intended also in the rejection of claim 9. The argument herein presumes that Smith '414 is the intended reference.

In the rejection of claim 9, the examiner notes that Isberg, Auvray '076 and Smith disclose the receiver of claim 3, but do not disclose implementing channel filtering in a digital manner. Eklof is relied upon to show this further detail recited in the claim. Accordingly, the foregoing argument with respect to the inadequacy of the teachings of Isberg and Smith, in respect to the rejection of claim 3, applies also to the rejection of claim 9. Therefore, claim 9 is believed to be free of rejection and to be allowable.

**FIFTH ISSUE OF WHETHER CLAIM 10 SHOULD BE REJECTED UNDER 35 U.S.C. 103 AS BEING UNPATENTABLE.**

Claim 10 was rejected under 35 U.S.C. 103 as being unpatentable over Isberg in view of Auvray '076), Smith, and Heck. The examiner made reference to Smith (US 5796772) which discloses material presented also in Smith (US 5694414). Since claim 10 depends from claim 3, and the rejection of claim 3 is based in part on Smith '414, it is presumed that Smith US 5694414 is intended also in the rejection of claim 10. The argument herein presumes that Smith '414 is the intended reference.

In the rejection of claim 10, the examiner notes that Isberg, Auvray '076 and Smith disclose the receiver of claim 3, but do not disclose controlling the gain of a second amplifier. Heck is relied upon to show these further details recited in the claim. Accordingly, the foregoing argument with respect to the inadequacy of the teachings of Isberg and Smith, in respect to the rejection of claim 3, applies also to the rejection of claim 10. Therefore, claim 10 is believed to be free of rejection and to be allowable.

**SIXTH ISSUE OF WHETHER CLAIMS 2, 12, 16, 18-20, 24-25, 27 and 29 SHOULD BE REJECTED UNDER 35 U.S.C. 103 AS BEING UNPATENTABLE.**

Claims 2, 12, 16, 18-19 (page 32 of the Office Action), 20, 24-25, as well as claims 27 and 29 (pages 35-40 of the Office Action) were rejected under 35 U.S.C. 103 as being unpatentable over Auvray '076 in view of Razavi, Auvray '641, and Smith, with Gore being added in the rejections of claims 27 and 29.

In the rejection of claim 2 and similarly with other ones of the claims, the examiner mentions numerous elements of the claimed subject matter, and relates these elements to elements in the description of Auvray (the specific Auvray patent is not identified but is presumed to be US 5564076). Razawi is employed to teach quadrature baseband signals, Auvray '641 is employed to teach multimode transmission, and Smith is employed to teach a gain of an amplifier being set with a programmed controlled gain control signal (page 27 of the Action at line 2).

It is urged that the disclosure of Smith (either one of the Smith patents) is being miss-applied for the reason set forth in the argument presented above with respect to overcoming the rejection of claim 1. It is the Applicant's position that Smith only considers tuning the amplifier to different frequencies, but does not teach a changing of the amplifier gain.

This point was made in the previous response of the Applicant. But the examiner held to his position (Office Action, page 40, Point 8) and stated that the programmed control signal of Smith is in response to the received radio band at the radio interface, and not just to tune to different frequencies.

A closer analysis of the Smith patent reveals the following. With reference to the top of page 27 of the Office Action, the passage cited by the examiner (Smith, col. 6 at line 63 to col. 7 at line 3, in conjunction with amplifier 115 of Fig. 2) deals with frequency selection. This passage says nothing about amplifier gain. However, the rejected claims make specific reference to the gain of the amplifier. Since the examiner relies on Smith

who fails to disclose gain control, but limits his teaching to frequency control, it is urged that the examiner fails to meet the requirement for presenting art that teaches an important element of each of the rejected claims. The foregoing argument, presented for overcoming the rejection of claim 2, applies also to overcoming the rejections of claim 12, claims 16, 18, 19 and 20 which depend from claim 12, claim 24 and its depending claim 25, and claims 27 and 29. This argument is believed to overcome the rejections under 35 U.S.C. 103 so as to show the presence of allowable subject matter in the claims.

## OBSERVATIONS APPLICABLE TO ALL SIX ISSUES

The examiner, by citing various passages from multiple references, has shown that components set forth in each of the present claims can be built. But none of the references, considered alone or in combination with other ones of the cited references, gives any suggestion or direction for building the complete invention, as set forth in any one of the claims. Thus, the citations of the various passages from the multiple references, provides no suggestion of the benefits of the present invention, namely, the reduction of complexity and physical size of the circuitry, as is discussed in the present specification. These benefits are very advantageous in electronic communication devices, such as cell phones, by way of example. Since there is no central theme in the cited art directing one to practice the present invention, as set forth in the subject matter of the various claims, there can be no motivation to combine these references.

According to the Manual of Patent Examining Procedure (MPEP, Section 2143), the mere fact that the references can be combined does not render the invention obvious. Rather, there must be some teaching of the invention that would motivate the combination of the references.

Accordingly, it is urged that the arguments presented herein have overcome the grounds of rejection to show the presence of allowable subject matter in the claims. It

is requested respectfully that the BOARD OF PATENT APPEALS AND INTERFERENCES reconsider the foregoing grounds of rejection under 35 U.S.C. 103, and find the present claims to be allowable.

The appendix of claims is attached hereto.

The Commissioner is hereby authorized to charge payment of $500.00 for the Appeal Brief fee and for the two month extension of time fee of $450.00 as well as for any additional fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,

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## VIII. CLAIMS APPENDIX

The texts of the claims involved in the appeal are presented in the following listing of the claims. For convenience, all claims are referenced with an indication of claims that have been canceled.

1. A method for processing signals received from different radio interfaces of communication systems, comprising steps in which:

- a carrier-frequency signal is received from a radio interface,
- the signal at the carrier frequency is bandpass-filtered,
- the filtered signal at the carrier frequency is amplified,
- a RX mixing signal at the receive frequency is generated,
- a complex baseband signal is generated from the received carrier-frequency signal by mixing it with the RX mixing signal,
- the baseband signal generated is low-pass filtered,
- the baseband signal generated is amplified or attenuated prior to analog-to-digital conversion,
- the baseband signal is converted to digital, and
- the baseband signal converted to digital is processed so as to produce an information signal encoded and modulated into the received carrier-frequency signal,
- wherein said amplifying of the carrier frequency signal is performed with one and same amplifier for signals received from at least two different radio interfaces, and a gain of said amplifier is set with a program-controlled gain control signal in relation to the radio interface from which signals are received,
- said generating of the complex baseband signal is performed with one and same mixer for signals received from at least two different radio interfaces,

- said RX mixing signal is generated with a frequency synthesizer, and an output frequency of said frequency synthesizer is selected with a program-controlled frequency selection signal in relation to the radio interface from which signals are received, and
- said bandpass-filtering is performed using a pass band selected with a program-controlled pass-band selection signal in relation to the radio interface from which signals are received.

2. A method for processing signals for transmission to different radio interfaces of communication systems, comprising steps in which:

- a digital baseband quadrature signal is generated on the basis of an information signal to be transmitted,
- the digital baseband quadrature signal is converted to analog,
- a TX mixing signal at a transmit frequency is generated,
- a carrier-frequency transmission signal is generated from the analog baseband quadrature signal by mixing the analog baseband quadrature signal with the TX mixing signal,
- the carrier-frequency transmission signal generated is amplified, and
- the amplified carrier-frequency transmission signal is transmitted to the radio interface,
- wherein said generating of a TX mixing signal at the transmit frequency comprises for at least one radio interface dividing a frequency of an output signal generated by a TX synthesizer, and said output signal of said TX synthesizer is selected with a program-controlled frequency selection signal in relation to the radio interface to which the amplified carrier-frequency transmission signal is transmitted,
- said generating of the carrier-frequency signal is performed with one and same mixer for signals to be transmitted to at least two different radio interfaces, and

- said amplifying of the carrier frequency signal is performed with one and same amplifier for signals to be transmitted to at least two different radio interfaces, and a gain of said amplifier is set with a program-controlled gain control signal in relation to the radio interface to which the amplified carrier-frequency transmission signal is transmitted.

3. A direct-conversion receiver operating at different radio interfaces of communication systems, comprising:

- antenna means for receiving a carrier-frequency signal from a radio interface,
- a bandpass filter (2) for filtering the carrier-frequency signal,
- a first receiver amplifier (4) for amplifying the filtered carrier-frequency signal,
- means (10, 11) for generating ~~an~~ a RX mixing signal at a receive frequency,
- mixing means (5) for generating a complex baseband signal from the received signal by means of the RX mixing signal,
- a low-pass filter (6) for filtering the baseband signal,
- a second amplifier (7) for amplifying the baseband signal,
- an analog-to-digital converter (8) for converting the baseband signal to digital, and
- means (9) for processing the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal,
- wherein said first receiver amplifier is common for amplifying signals received from at least two different radio interfaces and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio interface from which signals are received,
- said mixing means for generating the complex baseband signal is common for processing signals received from at least two different radio interfaces,

- said means for generating a RX mixing signal comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a RX mixing signal in relation to the radio interface from which signals are received, and
- said bandpass-filter (2) comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio interface from which signals are received.

4. – 5. (Canceled)

6. The receiver of claim 3, wherein the means (10, 11) for generating a mixing signal at the receive frequency comprises an RX synthesizer (10, S1) and controllable frequency divider (11, N1) for dividing the frequency of the output signal generated by the RX synthesizer.

7. The receiver of claim 6, wherein said frequency divider is arranged so as to divide the output signal of the RX synthesizer always by at least two in order to generate an RX mixing signal.

8. The receiver of claim 3, further comprising means (6, FX3) for controlling the cut-off frequency of low-pass filtering in order to perform channel filtering according to the selected radio interface.

9. The receiver of claim 3, further comprising means for implementing channel filtering realized in a digital manner.

10. The receiver of claim 3, further comprising means (7, GX2) for controlling the gain of the second amplifier.

11. The receiver of claim 3, wherein the signal processing path comprises substantially the same components for connecting to the different radio interfaces.

12. A direct-conversion transmitter operating at different radio interfaces of communication systems, comprising:

- means (9) for generating a digital baseband quadrature signal on the basis of an information signal to be transmitted,
- means for implementing channel filtering realized in a digital manner,
- a digital-to-analog converter (14) for converting the digital baseband quadrature signal to analog,
- a controllable low-pass filter (15, FX4) for filtering the analog baseband transmission signal in order to perform channel filtering according to the radio interface selected,
- a synthesizer (13, 12) for generating a TX mixing signal at the transmit frequency,
- mixing means (16) for producing a signal at the carrier frequency from the filtered analog baseband transmission signal by means of the TX mixing signal,
- an amplifier (17, 18) for amplifying the signal at the carrier frequency, and
- antenna means for transmitting the amplified transmission signal at the carrier frequency,
- wherein the means (13, 12) for generating a TX mixing signal at the transmit frequency comprises a TX synthesizer (13, S2) and controllable frequency divider (12, N2) for dividing the frequency of the output signal generated by the TX synthesizer, as well as an output frequency selection input for receiving a program-controlled output

frequency selection signal adapted to select the output frequency of said means for generating a TX mixing signal according to the radio interface selected,

- said mixing means for producing a carrier frequency signal is common for processing signals for transmission in at least two different radio interfaces, and

- said transmitter amplifier is common for amplifying carrier frequency signals for transmission to at least two different radio interfaces and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said transmitter amplifier according to the radio interface selected.

13. – 15. (Canceled)

16. The transmitter of claim 12, wherein said frequency divider is arranged so as to divide the TX synthesizer's output signal always at least by two in order to generate a TX mixing signal.

17. (canceled)

18. The transmitter of claim 12, further comprising a power amplifier section (18) in said amplifier, and a control input for receiving a control signal to said power amplifier section for controlling the operating frequency band of the power amplifier.

19. The transmitter of claim 12, further comprising a bandpass filter for filtering the amplified transmission signal at the carrier frequency, and means for selecting the pass band of the transmitter bandpass filter (3, FX2) so that it corresponds to the transmission frequency.

20. The transmitter of claim 12, wherein the signal processing path comprises substantially the same components for connecting to the different radio interfaces.

21. Direct-conversion receiver circuitry for operating in different radio communication systems, comprising:

- a first receiver amplifier (4) adapted to amplify a filtered carrier-frequency signal,
- a frequency synthesizer (10, 11) adapted to generate a RX mixing signal at a receive frequency,
- a mixer (5) adapted to generate a complex baseband signal from the amplified filtered carrier-frequency signal by mixing with the RX mixing signal,
- a second amplifier (7) adapted to amplify the baseband signal,
- an analog-to-digital converter (8) adapted to convert the amplified baseband signal to digital, and
- a coupling from the analog-to-digital converter (8) to a digital signal processor (9) adapted to process the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal;

wherein said first receiver amplifier is common for amplifying signals received from at least two different radio communication systems and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received,

wherein said mixer is common for processing signals received from at least two different radio communication systems,

and wherein said frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said means for generating a RX mixing

signal in relation to the radio communication system from which signals are received.

22. Direct-conversion receiver circuitry according to claim 21, additionally comprising a bandpass filter (2) adapted to filter a carrier-frequency signal to produce said filtered carrier-frequency signal, said bandpass filter (2) comprising a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received.

23. Direct-conversion receiver circuitry according to claim 21, additionally comprising a low-pass filter (6) between said mixer and said second amplifier, said low-pass filter being adapted to filter the complex baseband signal.

24. Direct-conversion transmitter circuitry for operating in different radio communication systems, comprising:

- an input for receiving a digital baseband quadrature signal representing an information signal to be transmitted,
- a digital-to-analog converter (14) adapted to convert the digital baseband quadrature signal to analog,
- a frequency synthesizer (13, 12) adapted to generate a TX mixing signal at a transmit frequency,
- a mixer (16) adapted to produce a signal at a carrier frequency from the analog baseband quadrature signal by mixing with the TX mixing signal,
- an amplifier (17, 18) adapted to amplify the signal at the carrier frequency, and
- an output for transmitting the amplified signal at the carrier frequency;

wherein the frequency synthesizer (13, 12) comprises a TX synthesizer (13, S2) and controllable frequency divider (12, N2) for dividing the frequency of the output signal generated by the TX synthesizer, as well as an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer according to the radio communication system selected,

wherein said mixer is common for processing signals for transmission in at least two different radio communication systems,

and wherein said transmitter amplifier is common for amplifying carrier frequency signals for transmission to at least two different radio communication systems and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said transmitter amplifier according to the radio communication system selected.

25. Direct-conversion transmitter circuitry according to claim 24, additionally comprising a controllable low-pass filter (15, FX4) between the digital-to-analog converter (14) and the mixer (16), said controllable low-pass filter being adapted to filter the analog baseband quadrature signal in order to perform channel filtering according to the radio communication system selected.

26. A direct-conversion receiver for operating in different radio communication systems, comprising:

- an antenna adapted to receive a carrier-frequency signal from a radio communication system,
- a bandpass filter (2) adapted to filter the carrier-frequency signal,
- a first receiver amplifier (4) adapted to amplify the filtered carrier-frequency signal,
- a frequency synthesizer (10, 11) adapted to generate a RX mixing signal at a receive frequency,

- a mixer (5) adapted to generate a complex baseband signal from the amplified filtered carrier-frequency signal by mixing with the RX mixing signal,

- a low-pass filter (6) adapted to filter the complex baseband signal,

- a second amplifier (7) adapted to amplify the filtered complex baseband signal,

- an analog-to-digital converter (8) adapted to convert the amplified filtered baseband signal to digital, and

- a digital signal processor (9) adapted to process the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal;

wherein said first receiver amplifier is common for amplifying signals received from at least two different radio communication systems and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received,

wherein said mixer is common for processing signals received from at least two different radio communication systems,

wherein said frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer in relation to the radio communication system from which signals are received,

and wherein said bandpass filter (2) comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received.

27. A direct-conversion transmitter for operating in different radio communication systems, comprising:

- a digital signal processor adapted to produce a digital baseband quadrature signal representing an information signal to be transmitted,

- a digital-to-analog converter (14) adapted to convert the digital baseband quadrature signal to analog,

- a controllable low-pass filter (15, FX4) adapted to filter the analog baseband quadrature signal in order to perform channel filtering according to the radio communication system selected,

- a frequency synthesizer (13, 12) adapted to generate a TX mixing signal at a transmit frequency,

- a mixer (16) adapted to produce a signal at a carrier frequency from the analog baseband quadrature signal by mixing with the TX mixing signal,

- an amplifier (17, 18) adapted to amplify the signal at the carrier frequency, and

- an antenna for transmitting the amplified signal at the carrier frequency;

wherein the frequency synthesizer (13, 12) comprises a TX synthesizer (13, S2) and controllable frequency divider (12, N2) for dividing the frequency of the output signal generated by the TX synthesizer, as well as an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to select the output frequency of said frequency synthesizer according to the radio communication system selected,

wherein said mixer is common for processing signals for transmission in at least two different radio communication systems,

and wherein said transmitter amplifier is common for amplifying carrier frequency signals for transmission to at least two different radio communication systems and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said transmitter amplifier according to the radio communication system selected.

28. A device for wireless communications, for operating in different radio communication systems, comprising:

- an antenna adapted to receive a carrier-frequency signal from a radio communication system,
- a bandpass filter (2) adapted to filter the carrier-frequency signal,
- a first receiver amplifier (4) adapted to amplify the filtered carrier-frequency signal,
- a frequency synthesizer (10, 11) adapted to generate a RX mixing signal at a receive frequency,
- a mixer (5) adapted to generate a complex baseband signal from the amplified filtered carrier-frequency signal by mixing with the RX mixing signal,
- a low-pass filter (6) adapted to filter the complex baseband signal,
- a second amplifier (7) adapted to amplify the filtered complex baseband signal,
- an analog-to-digital converter (8) adapted to convert the amplified filtered baseband signal to digital, and
- a digital signal processor (9) adapted to process the baseband signal converted digital so as to produce an information signal encoded and modulated into the received signal;

wherein said first receiver amplifier is common for amplifying signals received from at least two different radio communication systems and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said first receiver amplifier in relation to the radio communication system from which signals are received,

wherein said mixer is common for processing signals received from at least two different radio communication systems,

wherein said frequency synthesizer comprises an output frequency selection input for receiving a program-controlled output frequency selection signal adapted to

select the output frequency of said frequency synthesizer in relation to the radio communication system from which signals are received,

and wherein said bandpass filter (2) comprises a pass band selection input for receiving a program-controlled pass band selection signal adapted to select a pass band of said band pass filter in relation to the radio communication system from which signals are received.

29. A device for wireless communications, for operating in different radio communication systems, comprising:

- a digital signal processor adapted to produce a digital baseband quadrature signal representing an information signal to be transmitted,
- a digital-to-analog converter (14) adapted to convert the digital baseband quadrature signal to analog,
- a controllable low-pass filter (15, FX4) adapted to filter the analog baseband quadrature signal in order to perform channel filtering according to the radio communication system selected,
- a frequency synthesizer (13, 12) adapted to generate a TX mixing signal at a transmit frequency,
- a mixer (16) adapted to produce a signal at a carrier frequency from the analog baseband quadrature signal by mixing with the TX mixing signal,
- an amplifier (17, 18) adapted to amplify the signal at the carrier frequency, and
- an antenna for transmitting the amplified signal at the carrier frequency;

wherein the frequency synthesizer (13, 12) comprises a TX synthesizer (13, S2) and controllable frequency divider (12, N2) for dividing the frequency of the output signal generated by the TX synthesizer, as well as an output frequency selection input for receiving a program-controlled output frequency selection signal

adapted to select the output frequency of said frequency synthesizer according to the radio communication system selected,

wherein said mixer is common for processing signals for transmission in at least two different radio communication systems,

and wherein said transmitter amplifier is common for amplifying carrier frequency signals for transmission to at least two different radio communication systems and comprises a gain control input for receiving a program-controlled gain control signal adapted to set the gain of said transmitter amplifier according to the radio communication system selected.

## IX. EVIDENCE APPENDIX

There is no evidence appendix.

## X. RELATED PROCEEDINGS APPENDIX

There is no related proceedings appendix.